

# Neural Networks

## Topic

**Artificial Neural Networks: What they are, how they work, and why they matter**

## WebPages

- *Artificial Neural Network: What they are & why they matter*
- *Importance of Artificial Neural Networks in Artificial Intelligence*

## Objective

Read both texts and complete the activities to understand:

- what neural networks are
- how they work
- where they are used
- why they are important in AI

## ***Artificial Neural Network: What they are & why they matter***

### **Activity 1 – Multiple Choice**

Choose the correct answer.

1. Neural networks are systems with interconnected
  - a) screens
  - b) nodes
  - c) files
2. Neural networks can recognize hidden
  - a) patterns

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- b) chairs
- c) walls
- 3. The first neural network was conceived in
  - a) 1975
  - b) 1943
  - c) 2022
- 4. Deep learning systems are neural networks with
  - a) many layers
  - b) no data
  - c) no output
- 5. CNNs are commonly used for
  - a) image classification
  - b) cooking
  - c) cleaning
- 6. RNNs are useful for
  - a) image colors only
  - b) sequential information
  - c) maps only
- 7. One area where neural networks help is
  - a) fraud detection
  - b) bicycle repair only
  - c) sleeping
- 8. Feedforward neural networks have
  - a) many feedback loops
  - b) no feedback loops
  - c) no hidden layers

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## Activity 2 – Match the Term with the Definition

Match the concepts.

### Terms

- 1. CNN
- 2. RNN
- 3. Autoencoder
- 4. Hidden layer
- 5. Output layer

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## 6. Feedforward neural network

### Definitions

- A layer where the final result appears
- A type of network used for sequential data
- A type of network often used for image tasks
- A network that models the inputs themselves
- A network with no feedback loops
- A layer where processing happens between input and output

### Activity 3 – Fill in the Blanks

Complete the sentences with these words:

**Words:** brain, data, input, output, patterns, layers

- Neural networks work in a way similar to the human \_\_\_\_\_.
- They can recognize hidden \_\_\_\_\_ in raw data.
- Deep learning systems have many \_\_\_\_\_.
- The \_\_\_\_\_ layer receives the information first.
- The final answer appears in the \_\_\_\_\_ layer.
- Neural networks process large amounts of \_\_\_\_\_.

### Activity 4 – Put the Information in Order

Number the events from **1 to 4** in the correct chronological order.

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- \_\_\_ Deep learning systems became more important with big data.
- \_\_\_ Warren McCulloch and Walter Pitts conceived the first neural network.
- \_\_\_ Neural networks began to support tasks like speech recognition and medical diagnosis.
- \_\_\_ Kunihiko Fukushima developed the first multilayered neural network.

## Activity 5 – Short Answer

Answer in 1–2 complete sentences.

1. Why are neural networks important in real-life situations?

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2. What is one difference between CNNs and RNNs?

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3. Mention two industries that use neural networks.

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4. What happens when neural networks have many hidden layers?

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## ***Importance of Artificial Neural Networks in Artificial Intelligence***

### **Activity 6 – True or False**

Write **True** or **False**.

1. Artificial neural networks are part of artificial intelligence.
2. ANNs try to replicate the way humans learn.
3. The hidden layers keep all redundant information.
4. Facial recognition can improve company security.
5. Neural networks can improve over time based on user behavior.
6. Weights are important because they help neural networks learn.
7. Feed-forward networks pass data in one direction.
8. CNNs are mainly used for image data.
9. ANN decisions are always easy to explain.
10. Neural networks may require strong processors.

### **Activity 7 – Label the System**

Match each part to its function.

#### **Parts**

1. Input layer
2. Hidden layer
3. Output layer
4. Weights
5. Activation function
6. Threshold

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## Functions

- helps decide if the neuron activates
- shows the final result
- receives raw data
- helps measure the importance of a signal
- transforms the value before passing it on
- extracts the most important information

## Activity 8 – Sort the Ideas

Put the items into the correct category.

- fault tolerance
- black box
- needs powerful processors
- can work with inadequate data
- stores information across the network
- difficult to explain results

Advantages of ANN	Disadvantages of ANN

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## Activity 9 – Complete the Process

Put these steps in the correct order from 1 to 5.

- \_\_\_ Hidden layers process the information.
- \_\_\_ The output layer gives the final result.
- \_\_\_ The activation function decides if the neuron fires.
- \_\_\_ Raw data enters the input layer.
- \_\_\_ Weighted sums and bias are calculated.

## Activity 10 – Choose the Correct Option

Choose the correct option.

1. In the text, neural networks can be used for **fraud detection / baking bread**.
2. In the music example, the system learns from **user behavior / random guessing**.
3. RNNs are useful for **sequential data / wall painting**.
4. CNNs extract features from **images / shoes**.
5. A major disadvantage of ANN is that it is a **black box / simple calculator**.
6. ANN may need **parallel processing power / no electricity**.